

IN THE CLAIMS:

Cancel claims 1, 12 and 20.

Add new claim 21:

-- 21 . (New) A method for forming low defect density epitaxial layers on lattice-mismatched substrates, comprising the steps of:

- B1
- a) bonding a first substrate layer having a first lattice constant and a first thermal expansion coefficient to a second substrate layer having a second lattice constant and a second thermal expansion coefficient, thereby forming a composite substrate having a composite lattice constant and a composite thermal expansion coefficient;
  - b) disposing a buffer layer on the composite substrate, the buffer layer having a buffer layer lattice constant and a buffer layer thermal expansion coefficient; and
  - c) disposing a first epilayer on the buffer layer, the first epilayer having a first epilayer lattice constant and a first epilayer thermal expansion coefficient, the second lattice constant and second thermal expansion coefficient of the second substrate layer being selected so that

if the first epilayer lattice constant is greater than the composite lattice constant, then the first epilayer thermal expansion coefficient is smaller than the composite thermal expansion coefficient; and

if the first epilayer lattice constant is smaller than the composite lattice constant, then the first epilayer thermal expansion coefficient is greater than the composite thermal expansion coefficient;

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wherein the buffer layer lattice constant is selected to be substantially identical to the epilayer lattice constant and the buffer layer thermal expansion coefficient is selected so that

if the buffer layer lattice constant is greater than the composite lattice constant, then the buffer layer thermal expansion coefficient is greater than the composite thermal expansion coefficient, and

if the buffer layer lattice constant is smaller than the composite lattice constant, then the buffer layer thermal expansion coefficient is smaller than the composite thermal expansion coefficient. --

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Amend claim 2-5, 7, 8, 18 and 19 as follows:

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2. (Once amended) A method according to claim [1] 21, [further comprising the steps of]  
wherein disposing the buffer layer comprises:

growing [said] the buffer layer on [said] the composite substrate;

thermally annealing [said] the buffer layer and composite substrate when  
[said] the buffer layer reaches a thickness of a bending radius of at least a majority of threading dislocations present in [said] the buffer layer; and

repeating the steps of growing and thermally annealing until an aggregate buffer layer thickness is [above said] greater than the bending radius of substantially all threading dislocations present in the buffer layer.

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3. (Once amended) A method according to claim 2, wherein [said] the buffer layer is grown on [said top] the first substrate layer.

4. (Once amended) A method according to claim 2, wherein [said] the buffer layer is grown on [said additional] the second substrate layer.

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5. (Once amended) A method according to claim 2, [further comprising the step of] wherein disposing the first epilayer on the buffer layer comprises growing [said] the first epilayer on [said] the buffer layer.

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7. (Once amended) A method according to claim [1] 21, wherein said [top] first substrate layer is of a material selected from the group consisting of GaP, Si, and Ge.

8. (Once amended) A method according to claim 7, wherein said [additional] second substrate layer is of a material selected from the group consisting of InP, Ge, and Si.

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18. (Once amended) A method according to claim [1] 21, wherein the ratio of the thickness of the [top] first substrate layer to the thickness of the [additional] second substrate layer is greater than one.

19. (Once amended) A method according to claim 9, wherein the ratio of the thickness of the [top] first substrate layer to the thickness of the [additional] second substrate layer is greater than one.

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#### REMARKS

This Amendment is being provided in response to the outstanding office action for this case dated June 27, 2000. In this response, Applicants have canceled claims 1, 12 and 20, amended claims 2-5, 7, 8, 18 and 19, and added a new claim 21 in order to more particularly point out and distinctly claim that which Applicants deem to be the invention. New claim 21 replaces canceled claim 1 and is directed to the same subject matter as